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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/531,039	10/19/2005	Joseph P. Kenney JR.	GRA26 007	4714
7590		07/19/2007		
Mark C Comtois Duane Morris 1667 K Street N W Suite 700 Washington, DC 20006				
			EXAMINER	
			LEE, JOHN J	
			ART UNIT	PAPER NUMBER
			2618	
			MAIL DATE	DELIVERY MODE
			07/19/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/531,039

Applicant(s)

KENNEY ET AL

Examiner

JOHN J. LEE

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 April 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 2-19 is/are allowed.
- 6) ☒ Claim(s) 1 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments/Amendment

1. Applicant's arguments/amendments received on April 23, 2007 have been carefully considered but they are not persuasive because the teaching of all the cited reference reads on all the rejected claims as set forth in the pervious rejection. Therefore, the finality of this Office Action is deemed proper.

Contrary to the assertions at pages 2 - 5 of the Arguments, claim 1 is not patentable.

During examination, the USPTO must give claims their broadest reasonable interpretation.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Raleigh et al. (6,144,711) reference teaches a space-time signal processing system having multiple transmitter antenna elements and/or multiple receiver antenna elements with performing space-frequency processing adaptively create substantially independent spatial subchannels of significant cross talk interference between two or more array transmit and receive antennas in a communication system, and Motoyasu et al. (Japanese Patent Application No. 05-135996 or Publication 06-347529) teaches a communication system performing

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for receiving digital data, evaluating the multipath delay, and measuring bearing of interference by two or more array antenna elements having optional array elements and arrangement in a communication system.

Re claim 1: Applicant argues that the combination of teaching of Raleigh and Motoyasu do not teach the claimed invention “resolving the covariance matrix with a fictitious antenna array manifold”. However, The Examiner respectfully disagrees with Applicant’s assertion that the combination of teaching of Raleigh and Motoyasu do not teach the claimed invention. Contrary to Applicant’s assertion, the Examiner is of the opinion that Raleigh teaches significant simplification occurs when the interference covariance matrix is determined by averaging over frequency and solving the matrix by achieving in MIMO (multiple input and multiple output) antennas and significant averaging of the receive covariance matrix results in a good estimate of the transmit covariance, even though instantaneous channel reciprocity does not hold (see Fig. 17, 18 and column 21, lines 16 – column 22, lines 37), regarding the claimed limitation. Furthermore, Motoyasu teaches the signal received in two or more array antennas and receive section is changed into the digital data of real part and imaginary part (fictitious) with A/D converter and is stored in the receiving data memory, and the covariance-matrix characteristic vector count which receives this variable process and types (manifold), and the coherent signal (or multi-pass signal) which has perfect correlation in the part between the input signals of D individual, the rank of the signal matrix of correlation P becomes smaller than D (see paragraphs 0025 and 0029). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the

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Raleigh's system as taught by Motoyasu, provide the motivation to improve the interference reduction (brought about from radio multi-paths) in a space time communication system.

Applicant's attention is directed to the rejection below for the reasons as to why this limitation is not patentable.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claim 1** is rejected under 35 U.S.C. 103(a) as being unpatentable over Raleigh et al. (US Patent No. 6,144,711) in view of Motoyasu et al. (Japanese Patent Application No. 05-135996 or Publication 06-347529).

Regarding **claim 1**, Raleigh teaches that in a method for estimating the multi-path delays in a signal received at an antenna array of k antenna elements (Fig. 14 and column 1, lines 66 – column 2, lines 63, where teaches providing two or more substantially independent communication channels even in the presence of severe multipath and relatively poor physical antenna radiation pattern performance). Raleigh teaches that estimating an impulse response at each k antenna, generating a space-time impulse response (Fig. 4, 6 and column 11, lines 65 - column 12, lines 53, where teaches estimating the channel impulse response in the duration in symbol periods of the

significant portion of the channel impulse response at various multipath (antennas) processing a space-time impulse response of RF), forming a covariance matrix and resolving the covariance matrix with a known antenna array (Fig. 17, 18 and column 20, lines 31 – column 21, lines 62, where teaches forming covariance matrix and significant averaging of the receive covariance matrix results in a good estimate of the transmit covariance), the improvement comprising the step of resolving the covariance matrix with a fictitious antenna array manifold (Fig. 17, 18 and column 21, lines 16 – column 22, lines 37, where teaches significant simplification occurs when the interference covariance matrix is determined and significant averaging of the receive covariance matrix results in a good estimate of the transmit covariance, even though instantaneous channel reciprocity does not hold).

Raleigh does not specifically teach of [known antenna array] manifold, [the improvement comprising the step of resolving the covariance matrix with a fictitious antenna array] manifold (note that brackets are used for clarity in language and that it is believed these limitations are addressed by the above cited reference).

In a related art dealing with multi-path mitigation, Motoyasu teaches of [known antenna array] manifold (paragraphs 0025 and 0029), [the improvement comprising the step of resolving the covariance matrix with a fictitious antenna array] manifold (paragraphs 0025 and 0029).

It would have been obvious to one skilled in the art at the time of invention to have included into Raleigh's signal processing system, Motoyasu's measuring concepts, for the purposes of interference reduction (brought about from radio multi-paths) as

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taught by Motoyasu.

Allowable Subject Matter

4. Claims 2 - 19 are allowed.

Claims 2 - 19 are allowable over the prior art of record because a search does not detect the combined claimed elements as set forth in the claims 2 - 19.

As recited in independent claims 2, 10, and 18, none of the prior art of record teaches or fairly suggests that method for estimating the multipath delays in a signal using a spatially blind antenna array comprising k arbitrary antenna elements comprises generating an impulse response for each antenna element k in the antenna array, determining a vectorized space-time impulse response I over the antenna array, creating a covariance matrix C , creating a fictitious array manifold A , wherein A is spatially blind and independent of the array characteristics, and resolving the covariance matrix C with the fictitious manifold A to thereby estimate the multipath delays independent of the array characteristics, and together with combination of other element as set forth in the claims 2 - 19. Therefore, claims 2 - 19 are allowable over the prior art of records.

Conclusion

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

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Washington, D.C. 20231
Or P.O. Box 1450
Alexandria VA 22313

or faxed (571) 273-8300, (for formal communications intended for entry)

Or: (703) 308-6606 (for informal or draft communications, please label


"PROPOSED" or "DRAFT").

Hand-delivered responses should be brought to USPTO Headquarters,
Alexandria, VA.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **John J. Lee** whose telephone number is **(571) 272-7880**. He can normally be reached Monday-Thursday and alternate Fridays from 8:30am-5:00 pm. If attempts to reach the examiner are unsuccessful, the examiner's supervisor, **Edward Urban**, can be reached on **(571) 272-7899**. Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 305-4700.

J.L
July 7, 2007

John J Lee


EDWARD F. URBAN
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